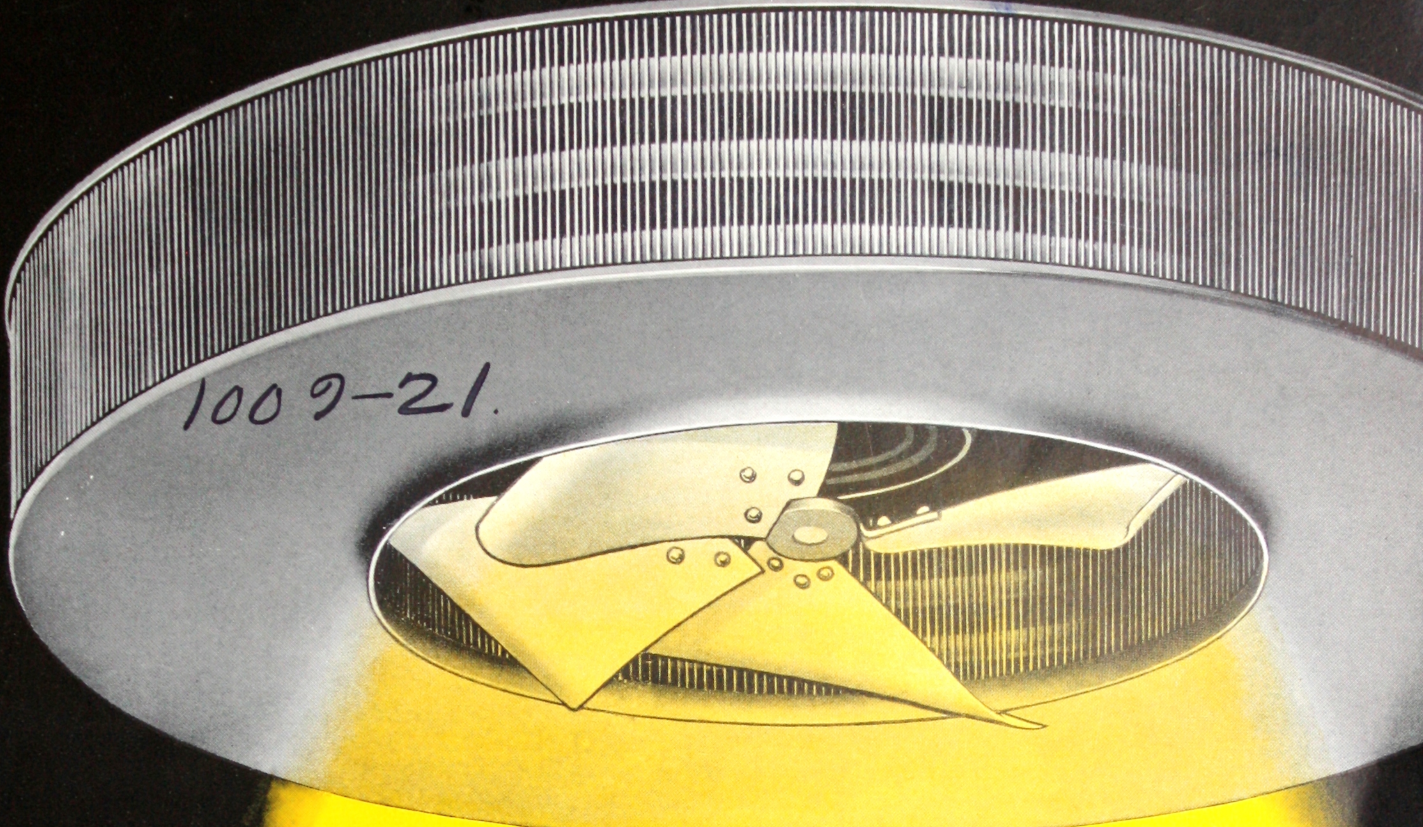


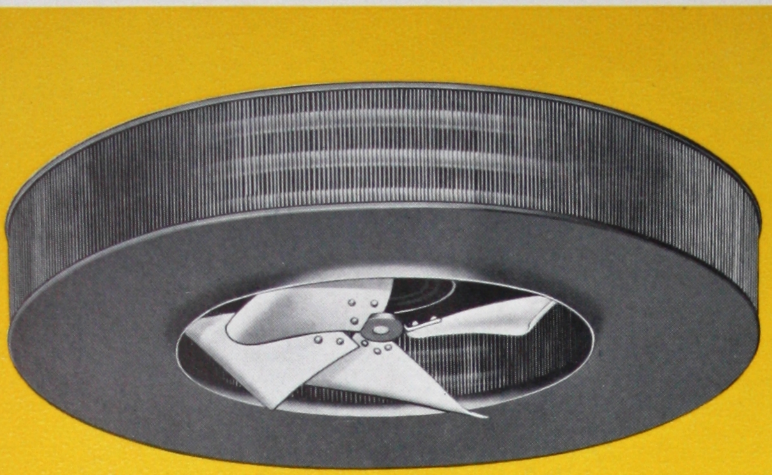
1009-21.

THE NEW TRANE *Projection* HEATER

A SCIENTIFIC DEVELOPMENT IN UNIFORM HEATING FOR FACTORIES • STORES
OFFICES • HALLS • LOBBIES • GARAGES • AND SIMILAR HEATING APPLICATIONS

BULLETIN NO. 284 ★ SEPTEMBER 1937

FRANKLIN INSTITUTE
PHILADELPHIA



Patents Applied For

Overhead and out-of-the-way, the sturdily and compactly constructed Trane Projection Heater utilizes the warm upper air in diffusing a vertical air stream with a far greater floor coverage than heretofore possible. Economical. Practical.

THE NEW TRANE

THE Trane Projection Heater, developed by the same Trane engineering skill which has pioneered and led the heating field for the past fifty years, is a refinement of a novel means for conveying the natural reservoir of warm air in the upper portions of a building down to the occupied zone or breathing line in an effective, efficient, and economical manner.

The natural tendency for warm air to rise and to stratify in horizontal planes near the ceiling is one of the most serious problems that has confronted the engineer in heating large spaces and especially buildings of considerable heights.

But it was left for Trane, in a new way, to attack this problem at its very root. The ceiling-mounted Trane Projection Heater is a compact, high velocity space heater of the propeller type. It provides velocities equal to those obtainable with blower types, but in a vertical air stream more suitable for the distant projection of warm air from considerable heights. Efforts to accomplish this are not new as it has long been recognized that such a result would markedly improve the efficiency of a heating system, but unfortunately most of the efforts were largely defeated through a design of unit which diffused the air stream too quickly. It is difficult to both diffuse the air stream and to carry it for a considerable distance at the same time. Yet the Trane Projection Heater accomplishes both purposes in a way which has not been hitherto attempted.

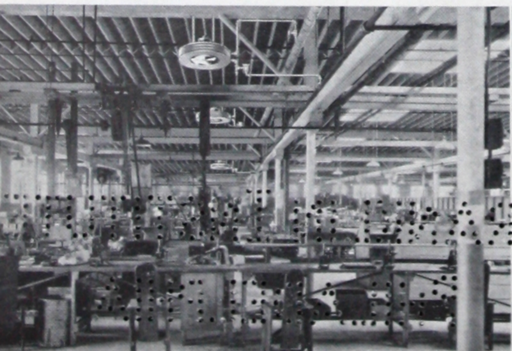
The inherent initial high velocity of this unit, plus its location in the midst of the natural reservoir of warm upper air found in all buildings, enables it to effectively and economically utilize this natural reservoir for needed floor heat purposes, and to reduce the temperature difference between floor and ceiling to a minimum. In so doing, it can readily be seen that the Trane Projection Heater effects a considerable fuel saving. (See page 6.) It projects the heat straight down to the floor in a manner comparable to the beam of a flood light. It unifies room temperature and prevents wasteful ceiling overheating.

Where, as is so often the case, room must be provided for piping, cranes, or factory equipment of one sort or another, the Projection Heater is found above the danger zone of entanglements. It can be put up above the steam main—in fact, that is the best place for it. This overhead, out-of-the-way, ceiling installation saves the valuable wall and interior space which other units require.

Trane Projection Heaters are designed and constructed to handle high as well as low steam pressures. For this reason fewer units are required since the heaters may be selected to operate on normal pressures for normal cold weather, and the same units may with perfect safety be operated at substantially higher pressures during the few days of the heating season when extra capacity is desired.

And to top it off, the Projection Heater is neither complicated nor ponderous. Its extreme light weight facilitates easy, two-point suspension and, if need be, it can be equipped with louvers or other diffusers for use in low-ceilinged places.

Thus, taking a cue from its own round shape, the Trane Projection Heater is the all around heating choice all the way around!



FACTORY

GARAGE

WAREHOUSE

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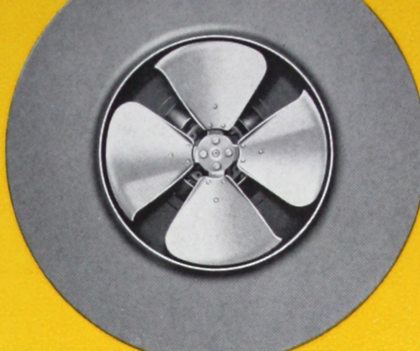
Projection HEATER



A head-on view showing the unobstructed position of the new Trane four-blade propeller fan whose slowly-accelerating, scientifically-curved tips quietly and efficiently do their duty with less power than other types require. Neat. Attractive.

EXCLUSIVE FEATURES!

1. **UNFORM HEAT DISTRIBUTION.** More warm air reaches and stays on and near the floor longer than with conventional heating units.

2. **EVENNESS OF TEMPERATURE.** A flood light beam of warm air blankets the floor at a constant temperature. No "cold streaks."

3. **ECONOMY.** Approximately one-fourth less steam is required because the Trane Projection Heater heats the floor where heat is needed — and not the upper spaces where it is not.

4. **GREATER COVERAGE AND DIFFUSION.** The Flood Light Beam of air which is projected straight downward to the floor diffuses over a far greater surface than do diagonal streams from other units. Fewer Projection Heaters needed.

5. **SPACE SAVER.** Overhead and out of the way, it saves valuable wall and interior space. Requiring a minimum of head room, the Projection Heater is conveniently out of the way of pipe lines or factory equipment even in low-ceilinged places.

6. **COIL.** The Extended Surface Coil is circular and, therefore, takes care of normal contraction and expansion. Heating surface requires only one-fourth the number of joints required by most surfaces on old type units.

7. **THE FAN.** The unobstructed overhead position of the new Trane four-blade propeller fan enables it to do the most work best.

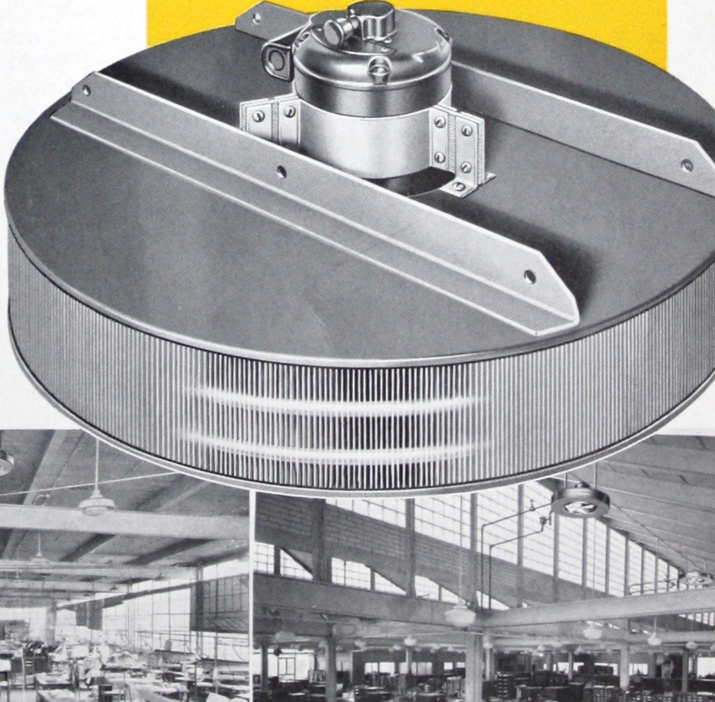
8. **COMFORT.** A true floor comfort zone is created and maintained by bringing the warm air to that level.

9. **GREATER UTILIZATION.** Whereas the conventional unit should only be used up to 12′ or 14′ heights, the Projection Heater can be installed at much higher elevations.

10. **INSTALLATION CONVENIENCE.** The extreme light weight of the Projection Heater facilitates easy two-point suspension or any other desired form of suspension.

11. **COMPACTNESS.** Structurally simple, this cleverly designed unit consists of coil, fan, and motor mounted between two circular plates. Sturdy and durable.

The Trane Projection Heater is designed for easy two-point suspension — or practically any other form of suspension desired. The resilient mounted motor is out of the path of the air stream. The circular coils take care of normal contraction and expansion. Dependability without worry.



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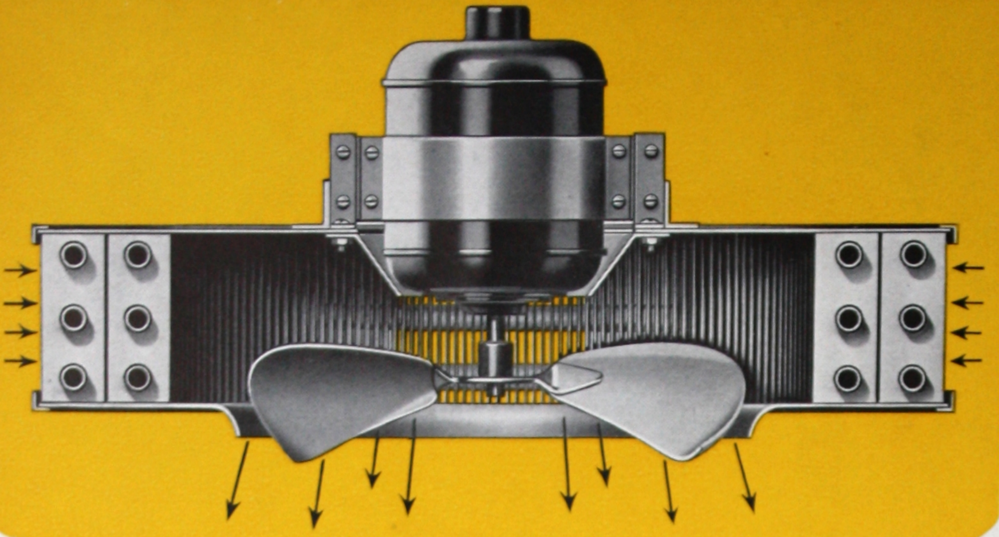
STORE

LAUNDRY

OFFICE



HOW THE PROJECTION HEATER OPERATES

Structurally, the Trane Projection Heater is simplicity itself. A two-row circular coil mounted between two circular plates. The upper plate is the supporting backbone of the unit. The lower provides the orifice through which the fan projects a flood light beam of heated air which reaches and stays on and near the floor and diffuses over a far greater surface than do air streams from conventional units.

With the Trane Projection Heater warm upper air is *drawn through* the circular coil at a low velocity and then projected straight downward to the floor by the quiet, new type, four-blade propeller fan whose unobstructed, strategic overhead position in the Projection Heater enables it to discharge a vertical air stream with an initial high velocity so effective for carrying this warm air considerable distances.

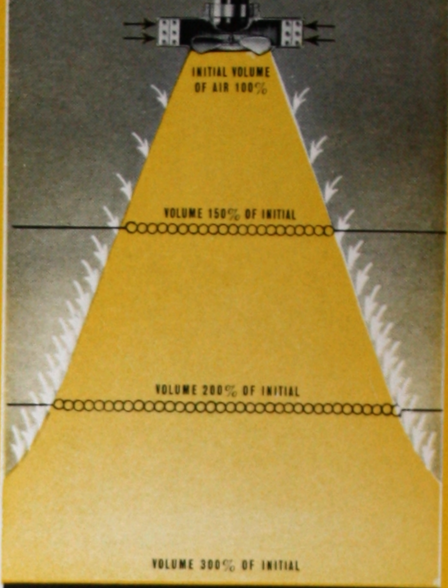
This method of discharging the heated air is the most significant difference between the Trane Projection Heater and other spot heating devices. The straight down unobstructed discharge of the Trane Projection Heater continues its direction until it reaches its goal—the floor.

As this air stream enlarges, flood-light fashion, its velocity decreases, so that when the air stream reaches the floor there are no noticeable drafts. The air stream, in its downward course, also induces a large volume of air which results in a gradual temperature drop. And, after reaching the floor, the direction of the air flow is horizontal. The Trane Projection Heater produces a warm blanket of floor air. Greater diffusion and greater floor coverage.

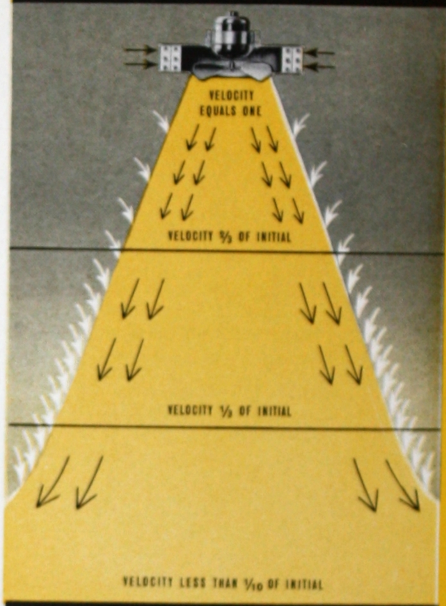
A hitherto infrequently encountered evenness of temperature and heat uniformity are economically achieved. And because there is an evenness between floor and ceiling temperature the warm air has less tendency to rise. The Trane Projection Heater not only puts heat on the floor, it keeps it there.

It is often said that the essential object of a heating plant is the comfort of the individual, and when one's feet are warm the first important step has been taken in accomplishing this desired result. The Trane Projection Heater, with its long-lasting floor spread of needed heat, accomplishes this desired result at a lower room temperature. This means fuel saving.

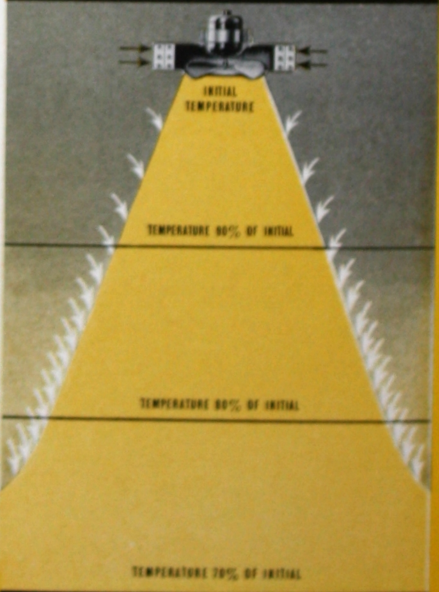
Not alone considerations of economy and greater efficiency, but the ever-increasing demand for a heating unit which can be used efficiently at high elevations prompted the development of the Trane Projection Heater. The effective initial high velocity of this unit relieves actual conditions of heat famine which have existed in countless buildings where the twelve to fourteen foot mounting limit imposed by older heating units has rendered heating such a difficulty.



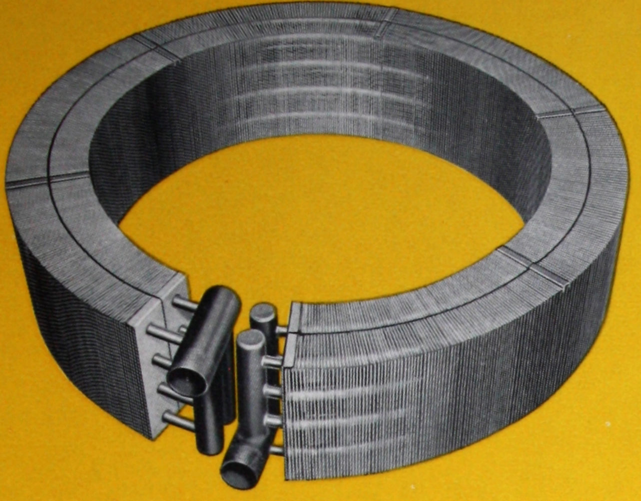
GREATER DIFFUSION . . . With a true floodlight spread, the Trane Projection Heater effects a greater and more lasting floor coverage than heretofore possible.

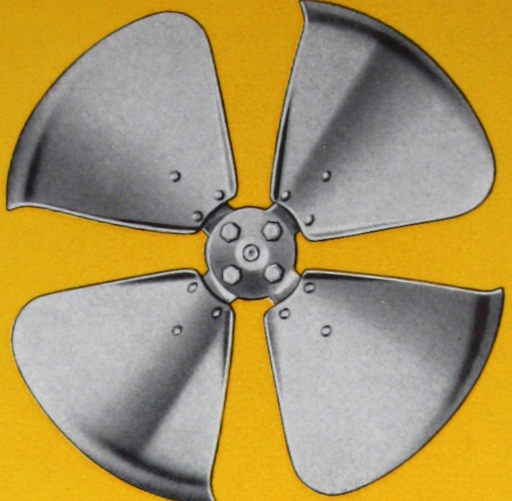


LOW FLOOR VELOCITY . . . From any height the Trane Projection Heater effectively supplies floor heat at such a negligible floor velocity that a real zone of comfort is the result.


INITIAL TEMPERATURE
TEMPERATURE 90% OF INITIAL
TEMPERATURE 80% OF INITIAL
TEMPERATURE 70% OF INITIAL

EVENNESS OF TEMPERATURE . . . No "cold streaks." No drafts. No useless overhead stratification. Instead, a hitherto infrequently encountered evenness of temperature is achieved.





THE *New* FAN AND CIRCULAR COIL

The essential component parts of any Unit Heater are the fan and the coils, but seldom before have either fan or coils been put to such advantageous and efficient use as in the new Trane Projection Heater.

FAN

The new four blade propeller fan, only recently designed and presented by Trane, does better work more quietly and effectively than other types. Unobstructed, in full view and not behind any coils, it is in an ideal position to gently project a constant vertical air stream with a maximum floor coverage.

The design of the fan insures the gracefully curved leading edges of the blades entering the moving air stream without shock — promoting smoothness! It provides for the gradual acceleration of the air particle so essential where quiet operation is to be attained.

Not only does this new fan give a far better performance. With the Trane Projection Heater it also is an aid to economy. The lower coil resistance encountered means a saving in power. And by drawing the air over the coils in straight streamlines at uniform velocity, the rapid churning and turbulence which contribute to noisy operation in blow through units is avoided.

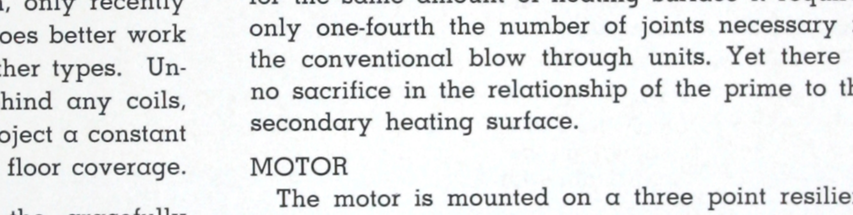
COIL

In the circular shape of the coil are found its useful, practical virtues. It can take care of itself as far as normal expansion and contraction go. And for the same amount of heating surface it requires only one-fourth the number of joints necessary in the conventional blow through units. Yet there is no sacrifice in the relationship of the prime to the secondary heating surface.

MOTOR

The motor is mounted on a three point resilient construction which prevents motor noises from being telegraphed to the metal parts of the unit. It also keeps the motor out of the air stream. Motors are provided with ball bearings suitable for taking any slight end thrust when vertically mounted. They also provide a lubrication which normally need not be serviced during an entire heating season.

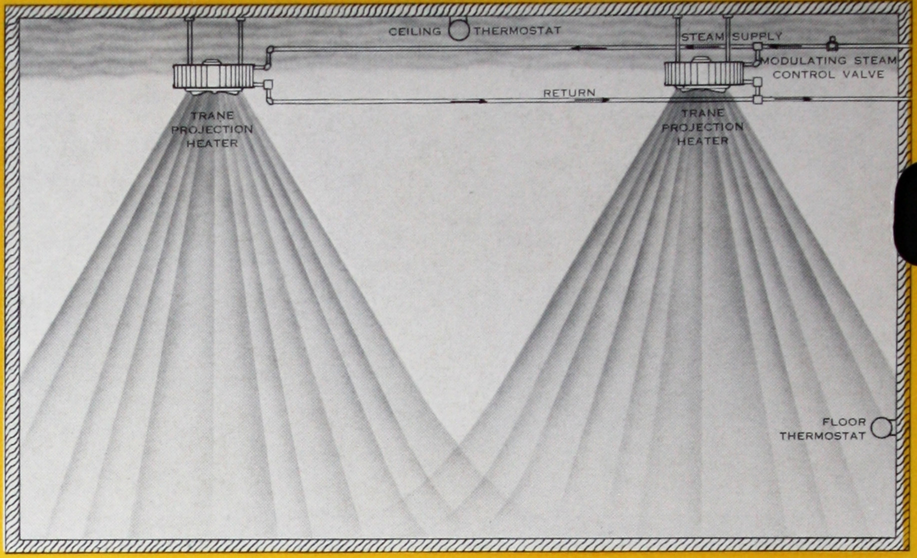
Thus fan, coils, and motor, simple in themselves, are uniquely designed and utilized by Trane engineers to blend into a space heater of unexcelled efficiency and economy — the Trane Projection Heater.



ADAPTABILITY
Either directional louvers or other diffusers may be installed on low mounted units to give necessary heat spread on unusual applications. Grilles give directional flow in one, two, three, or four directions.

THE TRANE TEMPERATURE EQUALIZING SYSTEM

PATENTS APPLIED FOR



Artist's drawing showing essential parts of the Trane Temperature Equalizing System. Note the floor and ceiling thermostats indicated by small circles, and the modulating steam control valve in the supply line to the Trane Projection Heaters.

Not just a Unit, but a system — that's Trane thoroughness. The unique features of the Trane Projection Heater — its vertical air stream, its economical use of the warm upper air, its flood light floor spread — all these suggested and called for a thermostatic control system to realize the maximum benefits from each. And the Trane Temperature Equalization System is the answer. It is an ingenious and useful hook-up whereby the Trane Projection Heater can be used to its greatest advantage.

A floor thermostat, connected with a magnetic switch, governs both the action of the fans and, through a modulating steam control valve, the steam supply. A ceiling thermostat governs the fans only.

When the floor thermostat calls for heat, both fans and steam supply go into action. As soon as the desired temperature is reached, the steam supply is shut off, but the fans continue their downward diffusion of the natural reservoir of warm upper air, provided the temperature of this air is *above* the pre-determined point at which the ceiling thermostat stops the fans with a consequent saving in power.

The constant projection of the warm ceiling air downward until its temperature falls below the pre-determined point is valuable in maintaining an even floor temperature and in reducing the differential between the floor and ceiling temperatures to a desired difference.

It can readily be seen that this system not only promotes a hitherto impossible evenness of temperature and prevents overheating, but it also, through the operation of the fans alone, prolongs the period during which no steam is required.

A considerable saving in heating costs and a higher degree of personal comfort are the practical results.

EXAMPLE OF FUEL SAVING WITH THE TRANE PROJECTION HEATER

The ability of the Trane Projection Heater to reduce temperature differences between floor and ceiling, to prevent overheating, and, through substantially reduced heat losses, to effect a considerable fuel saving, can be mathematically and graphically illustrated. These economical features of the Trane Projection Heater stand in sharp contrast to heat waste under conventional heating systems. It will be noted that the greater the outside temperature, the greater the percentage of heat saving.

EXAMPLE NO. 1

(At 0° Outside Temperature)

Assume that in the case of *Figure No. 1* we have a building 400 ft. long, 40 ft. wide and 20 ft. high where the wall and ceiling exposure are equal or 16,000 sq. ft. net each. Also assume there are 5000 sq. ft. of glass. The heat loss calculation would be as follows:

Roof 16,000 x 1.49 (Roof coefficient) x 100°

(Temperature difference between outdoors and room) = 2,384,000 Btu loss

Wall 16,000 sq. ft x .32 (coefficient) x 85° (T. D. average) = 435,000 Btu

Glass 5000 x 1 (coeff.) x 85° (T. D.) = 425,000 Btu
Contents 32,000 cubic feet x 1 (Air Change) x 70° (T. D.) ÷ 55 = 407,000 Btu

The total loss or amount of heat necessary to maintain 70° breathing line temperature would be 3,651,000 Btu or approximately 15,300 sq. ft. of radiation.

In *Figure No. 2* the roof loss, based on the 80° temperature, difference would be 1,915,000 Btu, the wall 383,000 Btu, the glass 375,000 Btu and contents 407,000 Btu or a total of 3,080,000 Btu or 12,850 sq. ft. of radiation.

The result shows the conventional units require 18½% more heat. The Trane Projection Heater achieves a fuel saving of 15⅔%.

EXAMPLE NO. 2

(At 30° Outside Temperature)

There is a greater percentage in heat loss as the outdoor temperature rises as will be noticed by the following comparison of Figure No. 3 and No. 4.

We will take the same building into consideration and the heat loss would be calculated as follows:

Figure No. 3

Roof 16,000 x 1.49 x 70° = 1,670,000 Btu loss
Wall 16,000 x .32 x 55° = 282,000 Btu loss
Glass 5,000 x 1. x 55° = 275,500 Btu loss
Contents
32,000 x 40° x 1 ÷ 55 = 233,000 Btu loss
Total Btu loss = 2,460,500

Figure No. 4

(Roof) 16,000 x 1.49 x 50° = 1,195,000
Wall 16,000 x .32 x 45° = 230,000
Glass 5,000 x 1. x 45° = 225,000
Contents
32,000 x 40° x 1 ÷ 55 = 233,000
Total Btu loss = 1,883,000

The result shows the conventional units require 30.7% more heat. The Trane Projection Heater achieves a fuel saving of 23½%.

FUEL SAVING EFFECTED BY TRANE PROJECTION HEATER 15⅔%

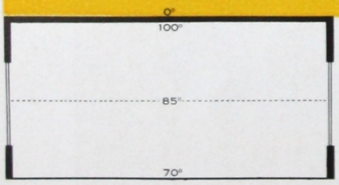


Fig. 1—Conventional Heating Units.

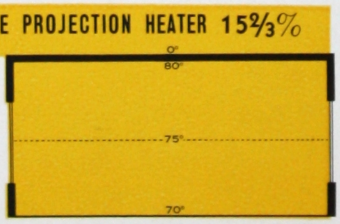


Fig. 2—Trane Projection Heater.

FUEL SAVING EFFECTED BY TRANE PROJECTION HEATER 23½%

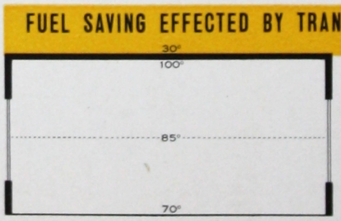


Fig. 3—Conventional Heating Units.

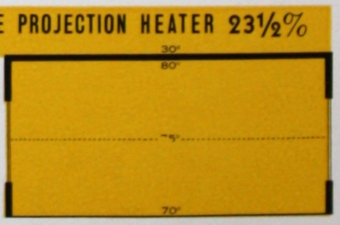
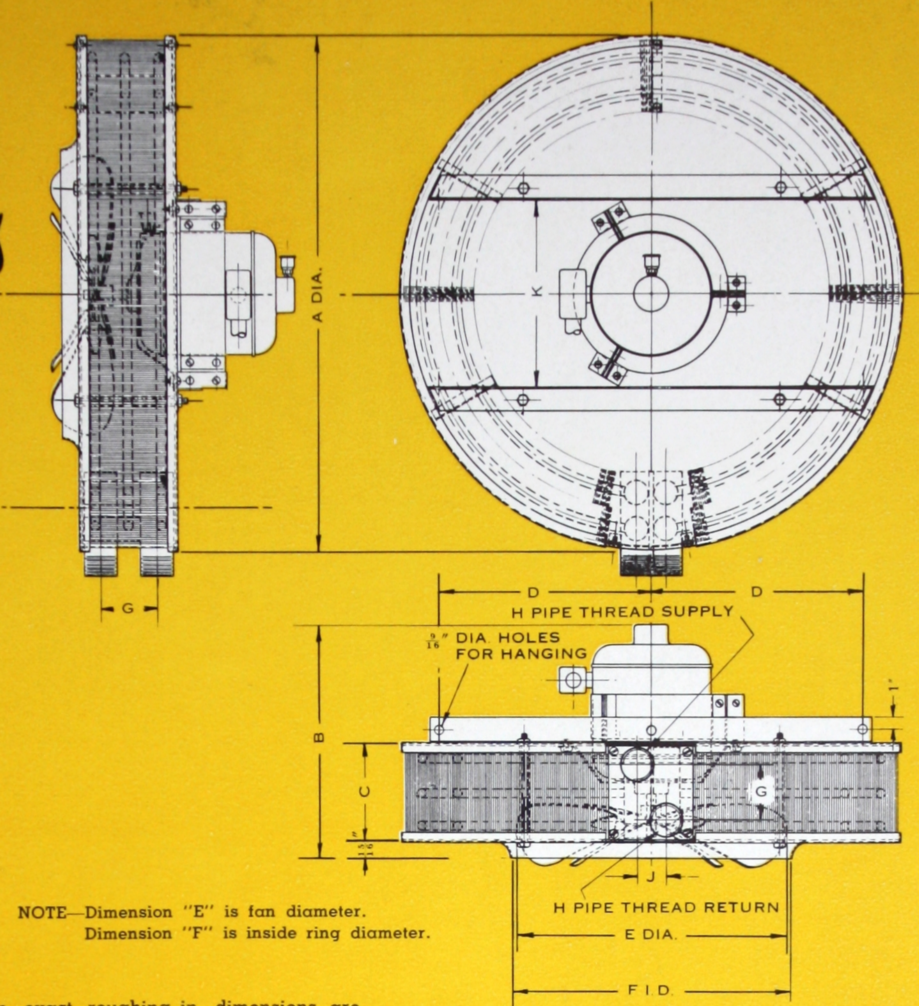


Fig. 4—Trane Projection Heater.

Roughing in Dimensions

Dimension	UNIT NUMBER				
	12P	15P	18P	20P	22P
A	24¾″	29″	33¼″	33¼″	41¾″
B	12″	14″	18″	19″	19″
C	3 5/16″	5½″	7½″	10 11/16″	10 11/16″
D	8 5/16″	10½″	12⅝″	11½″	16½″
E	12¾″	15½″	18″	20¼″	22½″
F	12⅞″	15⅞″	18⅜″	20⅜″	23⅜″
G	1¾″	3 3/16″	5 3/16″	7⅞″	7⅞″
H	1″	1½″	1½″	2″	2″
J	1½″	1 11/16″	1 11/16″	2 3/32″	2 3/32″
K	9½″	10¼″	11¾″	16⅛″	15″



NOTE—Dimension "E" is fan diameter.
Dimension "F" is inside ring diameter.

When exact roughing in dimensions are required certified prints will be furnished.

SPECIAL CAPACITIES

The capacity of any Trane Projection Heater under any conditions of steam pressure and entering air may be figured from the conversion table below.

EXAMPLE:

Given: A Trane Projection Heater with a rated capacity of 52,000 Btu at 2 pounds steam and 60° entering air.

Desired: Capacity of this unit using 20 pounds of steam and 40° entering air.

Under 40° and 20 pounds in the conversion table, we find factor 1.350.

52,000 × 1.350 = 72,200 Btu per hour.

If working in EDR rather than Btu, multiply EDR by the same factor in the same way if EDR is known. Otherwise, divide the Btu by 240.

CAPACITIES

Unit No.	R.P.M. Speed	Motor H.P.	Btu per Hr. 60° Ent. Air 2-lb. Pressure	E.D.R.	C.F.M.	Fan Diam.	Final Temp.
12-P	1150	1/20	52,000	217	960	12¾″	110
	1725	1/6	66,000	275	1430		102.5
15-P	1150	1/10	92,000	384	1700	15½″	110
	1725	1/3	116,000	484	2520		102.5
18-P	1150	1/6	146,000	610	2700	18″	110
	1725	1/2	185,000	771	4000		102.5
20-P	1150	1/3	206,000	860	3800	20¼″	110
22-P	1150	1/2	285,000	1190	5250	22½″	110

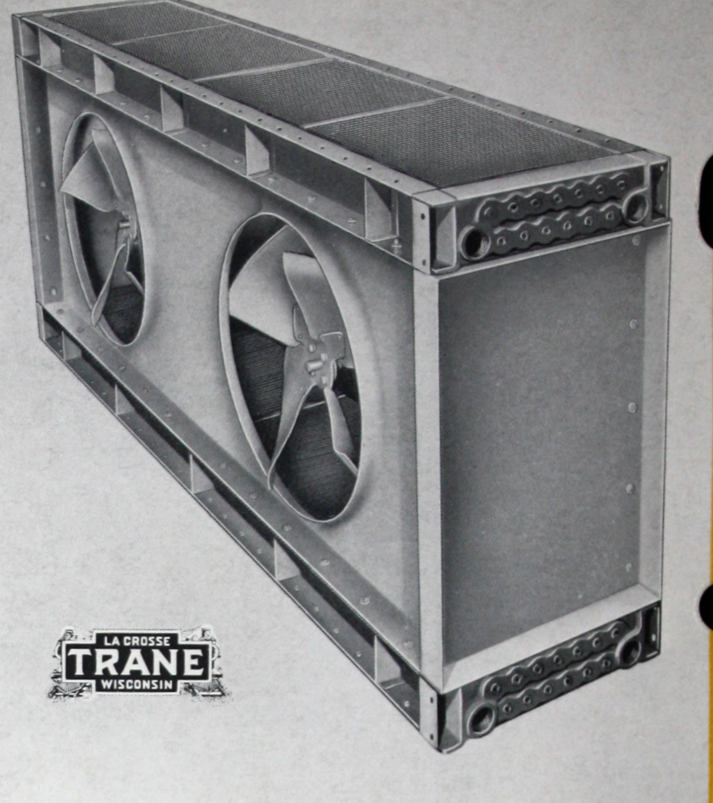
CONSTANTS FOR DETERMINING CAPACITY OF TRANE PROJECTION HEATERS FOR VARIOUS PRESSURES AND TEMPERATURES

TABLE BASED ON STEAM AT 2 LBS. GAUGE AND 60° ENTERING AIR

Steam Pressure Lb. per Sq. In. Gauge	TEMPERATURE OF AIR ENTERING HEATER																
	-10°	0°	10°	20°	30°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	100°
0	1.483	1.405	1.329	1.253	1.178	1.105	1.070	1.032	.997	.962	.926	.892	.858	.822	.788	.754	.688
2	1.520	1.442	1.363	1.290	1.215	1.141	1.105	1.069	1.035	1.000	.965	.930	.895	.861	.825	.792	.728
5	1.565	1.485	1.410	1.334	1.260	1.187	1.150	1.114	1.080	1.045	1.010	.975	.940	.906	.872	.838	.771
10	1.637	1.558	1.480	1.403	1.328	1.253	1.219	1.182	1.148	1.112	1.078	1.042	1.008	.973	.938	.903	.838
20	1.728	1.649	1.572	1.498	1.421	1.350	1.313	1.278	1.243	1.208	1.172	1.138	1.104	1.070	1.035	1.002	.936
50	1.927	1.850	1.773	1.700	1.628	1.554	1.520	1.483	1.450	1.416	1.382	1.347	1.312	1.278	1.245	1.211	1.145
75	2.043	1.970	1.895	1.822	1.750	1.680	1.645	1.609	1.573	1.540	1.505	1.471	1.438	1.402	1.369	1.333	1.268
100	2.150	2.071	1.994	1.919	1.845	1.770	1.735	1.700	1.665	1.630	1.595	1.560	1.527	1.492	1.460	1.425	1.359

TRANE MULTIPLE PROJECTION HEATER

Light in weight and easy to install, the new Trane Multiple Projection Heater is another long step ahead in space heating. Again, as in the smaller Trane Projection Heater, air is drawn through the coils and then blown out with an evenness of temperature and with a greater floor coverage than heretofore achieved. The Multiple Projection Heater is primarily designed and intended for large buildings where circumstances demand the use of fewer units of greater capacity. No need to run it full blast all the time. On many days a single fan, providing the floor with a uniform spread of heat, is sufficient. Less Power. Less Space. Greater Flexibility of Heat Control. A true provider of economical comfort.



THE TRANE SPACE HEATING LINE

Trane offers a unit heater for every need and for every purpose. In the practical Model "N" line, embodying the "Cradle Coil" and "Floor Line Spread," there are over sixty different standard styles and sizes with the most complete range of capacities commercially available. There is exactly the proper unit for every requirement.

The new Trane Projection Heater, described in this bulletin, provides efficient, economical heating from a higher mounting point than heretofore possible. Its big brother, the Trane Multiple Projection Heater (illustrated above), light in weight, is a real value in heating larger spaces where no duct work is involved. A wide variety of blower type units — the famed Trane Torridors — are ordinarily specified for duct work applications and for floor installations, where the discharged horizontal air stream must be carried to considerable distances.

Trane also manufactures a De Luxe line of propeller type unit heaters for discriminating stores and shops where attractiveness is a major consideration and it is desirable to have the unit entirely enclosed.

The name Trane on a heating unit immediately identifies a superior product — an internationally-known, approved, and specified line of heating, cooling, and air conditioning equipment.

Trane furnishes not only space heaters but all the specialties and allied items necessary to provide an Undivided Responsibility system of heating.

OVER SEVENTY U. S. BRANCHES

Albany, New York
Altoona, Pennsylvania
Amarillo, Texas
Atlanta, Georgia
Aurora, Illinois
Baltimore, Maryland
Birmingham, Alabama
Boston, Massachusetts
Bridgeport, Connecticut
Brooklyn, New York
Buffalo, New York
Canton, Ohio
Charleston, West Virginia
Chicago, Illinois
Cincinnati, Ohio
Clarksburg, West Virginia
Cleveland, Ohio
Columbus, Ohio
Dallas, Texas
Davenport, Iowa
Dayton, Ohio
Denver, Colorado
Des Moines, Iowa
Detroit, Michigan
Findlay, Ohio
Flint, Michigan
Greensboro, North Carolina
Greenville, South Carolina
Harrisburg, Pennsylvania
Houston, Texas
Indianapolis, Indiana
Jackson, Mississippi
Jacksonville, Florida
Juneau, Alaska
Kalamazoo, Michigan
Kansas City, Missouri
La Crosse, Wisconsin
Lake Charles, Louisiana
Little Rock, Arkansas
Livingston, Montana
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